Amphibian and Reptile Surveys on Montana Refuges: 1998 - 1999

A Report to the
U.S. Fish and Wildlife Service:

Montana Field Office
C.M. Russell National Wildlife Refuge
Medicine Lake National Wildlife Refuge

Submitted by
Paul Hendricks

December, 1999

1515 East Sixth Avenue, P.O. Box 201800, Helena, MT 59620-1800

This document should be cited as follows:

Hendricks, P. 1999. Amphibian and reptile surveys on Montana refuges: 1998-1999. Montana Natural Heritage Program. Helena, MT. 22 pp.

ABSTRACT

A total of 19 site surveys for amphibians and reptiles was conducted at 15 National Wildlife Refuge (NWR) and Waterfowl Production Area (WPA) "units" in 1998-1999 in central and eastern Montana. Sites were chosen to augment data already available on these Fish and Wildlife Service units in the Montana Natural Heritage Program databases, to fill distribution gaps, and to visit sites where species rare in Montana were reported previously. No sites were visited more than twice, however, thus species tallies for each site are incomplete. Surveys, made by one individual, focused on wetlands, such as ponds, lakes, streams or seeps. Because of this habitat focus, reptiles especially were underrepresented in the results, unless associated with wetland sites. Surveys lasted 15-240 minutes, depending on site conditions and/or size. Opportunistic observations made in the region during field work, along with sightings reported by USFWS personnel, are included in this report.

Four amphibian and three reptile species total were detected on 12 site surveys at 9 units. The species detected included Tiger Salamander (*Ambystoma tigrinum*) on 1 survey (1 unit), Western Chorus Frog (*Pseudacris triseriata*) on 4 surveys (3 units), Woodhouse's Toad (*Bufo woodhousii*) on 2 surveys (2 units), Northern Leopard Frog (*Rana pipiens*) on 4 surveys (3 units), Painted Turtle (*Chrysemys picta*) on 1 survey (1 unit), Racer (*Coluber constrictor*) on 1 survey (1 unit), and Plains Garter Snake (*Thamnophis radix*) on 3 surveys (2 units). Refuge personnel contributed several records of opportunistic encounters for species not detected during surveys at one unit (Medicine Lake NWR), and at one other unit (Bowdoin NWR) where site surveys were not conducted. Seven additional site surveys and 4 opportunistic observations in the vicinity of several units (but not on USFWS lands) indicated the likely occurrence of some species on refuge units where they were not detected.

TABLE OF CONTENTS

ACKNOWLEDGMENTS

Thanks to Martin Miller for data entry and Cedron Jones for producing the map. Financial support for the project came from Challenge Cost-Share Agreement No. 1448-60181-98-J380 between the U.S. Fish and Wildlife Service and the Montana Natural Heritage Program.
Museum records of Montana amphibians and reptiles were received from over 20 institutions (a list is available in previous reports on amphibian and reptile surveys). These important records form the historical base from which changes in abundance and distribution can be identified. Most museum data were received with the help of Dr. Charles Peterson, Idaho State University, Pocatello. Other records pertinent to this report and period of study were made available by Dr. Kirwin Werner (Ronan), Ted Nordhagen (Westby), Frank Durbian (Bowdoin NWR), and Beth Madden (Medicine Lake NWR).

INTRODUCTION

Populations of several amphibian species are currently declining in the western U.S. and elsewhere around the world. Acid rain, ozone depletion, pollution by toxic chemicals and heavy metals, predation and/or competition by exotic species, habitat alteration, climatic changes, disease, immune system problems, and combinations of several of these factors have all been suggested as possible causes (Corn and Fogelman 1984, Phillips 1990, Yoffe 1992). Recognition of these alarming population trends has renewed interest in the status amphibian populations in particular, and raised awareness regarding current ignorance of the status of many reptile species as well.

The amphibians and reptiles occupying the plains of eastern Montana have received scant attention by naturalists and biologists. As a consequence, we know very little about the status, population trends, habitat requirements, and reproductive biology of many species within this region of the state. With new information acquired in the last 5 years from a series of regional inventories of the herpetofauna in eastern Montana (e.g., Reichel 1995b, Hendricks and Reichel 1996, Hendricks and Reichel 1998, Roedel and Hendricks 1998, Hendricks 1999), we are gaining an understanding of abundance and population trends for several species. In addition, we are "fleshing out" known distributions that were largely based on opportunistic encounters and other data at least half a century old.

In 1805-1806 Lewis and Clark were the first to document the presence of Spiny Softshell (*Trionyx spiniferus*), Eastern Short-horned Lizard (*Phrynosoma hernandezi*), Western Terrestrial Garter Snake (*Thamnophis elegans*), and Western Rattlesnake (*Crotalis viridis*) along the Missouri River in present-day eastern Montana (Burroughs 1995). Most additional published accounts of amphibians and reptiles in eastern Montana are concentrated along the Missouri River corridor and its tributaries. Notable among these reports is that of Cope (1879), who commented on the occurrence of 5 amphibian and 3 reptile species between the Judith River and Armells Creek. More recently, Mosimann and Rabb (1952) documented the presence of 4 amphibian and 7 reptile species in the Tiber Reservoir area along the Marias River of northcentral Montana. The written record of exploration of Montana in the 19th century and first half of the 20th century, and unpublished museum collection records, provide the base for analyses of historical distributions and population trends. Additional distribution and status information for border regions can be gleaned from Wheeler and Wheeler (1966) for North Dakota, Visher (1914) for South Dakota, Baxter and Stone (1985) for Wyoming, and Secoy and Vincent (1976) for Saskatchewan.

Preliminary data gathered from site surveys and revisits to historical sites indicate that the Northern Leopard Frog (*Rana pipiens*) has disappeared over much of its former range in western Montana (Werner et al. 1998) and is declining in at least some areas of eastern Montana. Status and population trend of several toad species (*Bufo* spp.) are unknown, although declines of the Western Toad (*Bufo boreas*) have been reported recently in northern Idaho (C. Peterson pers. comm.), northwestern Montana (Werner and Reichel 1994, Werner et al. 1998), Yellowstone National Park (Koch and Peterson 1995) and Colorado (Carey 1993).

Land-use practices, such as large-scale logging, continue to be detrimental to resident amphibians in some regions of the western U.S. (Bury et al. 1991). The impacts of grazing on amphibians and reptiles and their habitats remain poorly studied and understood. Heavy grazing in and around breeding sites associated with water may negatively impact amphibians and reptiles by 1) eliminating emergent vegetation necessary for egg and larval survival, 2) lowering water quality, especially causing high siltation levels, 3) trampling of eggs, larvae and adults, and 4) degrading the amphibian and reptile food base. Additionally, modification of seeps and springs for livestock watering, by capturing water flow in tanks, may make former breeding sites unusable by amphibians.

The Montana Natural Heritage Program currently lists five amphibian and five reptile species as Animal Species of Special Concern (Roedel 1999). Of these, two amphibian and five reptile species have been documented in eastern Montana. They are Canadian Toad (*Bufo hemiophrys*), Northern Leopard Frog (*Rana pipiens*), Common Snapping Turtle (*Chelydra serpentina*), Spiny Softshell (*Trionyx spiniferus*), Western Hognose Snake (*Heterodon nasicus*), Milk Snake (*Lampropeltis triangulum*), and Smooth Green Snake (*Liochlorophis* [=*Opheodrys*] *vernalis*). Most of the above species are of special concern because of limited distributions or relatively few records in recent years, but there is evidence of a significant decline in Northern Leopard Frog populations in the last 30 years in western and central portions of the state. The species is now listed as Sensitive by the U.S. Forest Service, Region 1.

In 1998-1999, several refuge "units" under stewardship of the U.S. Fish and Wildlife Service (Refuges and Waterfowl Production Areas) were visited and surveyed briefly for amphibians and reptiles. Objectives of the work presented in this report were to 1) augment data already available on these Fish and Wildlife Service units in the Montana Natural Heritage Program databases, 2) fill distribution gaps, and 3) visit sites where species rare or of special concern in Montana were reported previously.

METHODS AND MATERIALS

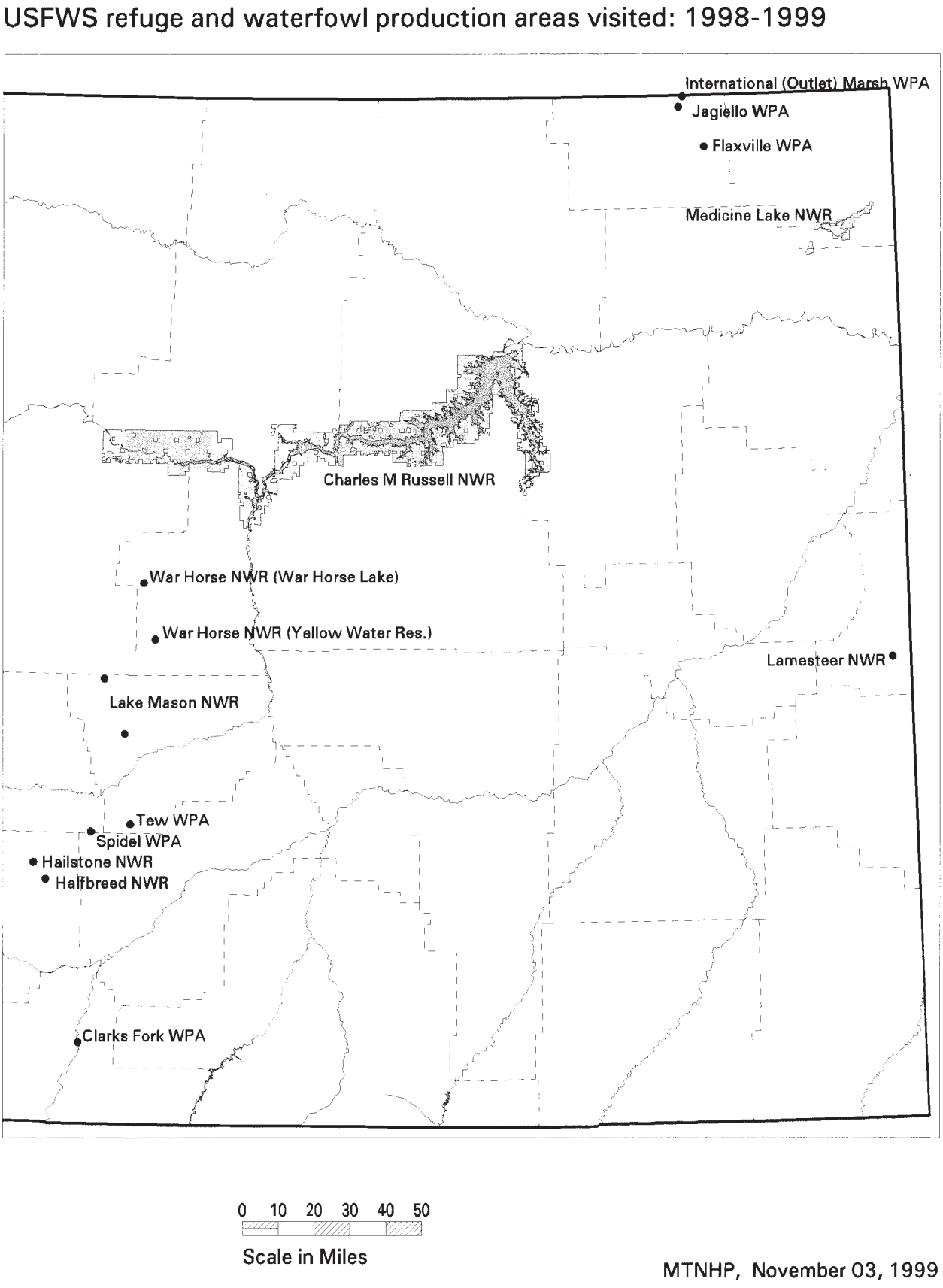
Seven National Wildlife Refuges (Medicine Lake, Charles. M. Russell, Lake Mason, War Horse, Hailstone, Halfbreed, Lame Steer) in central and eastern Montana were visited, and site surveys were conducted of all or portions of each in 1998-1999. Records from 1999 were also received from USFWS personnel at Medicine Lake and Bowdoin NWR's; the latter was not visited during this inventory. In addition, six Waterfowl Production Areas (Tew, Spidell, Clarks Fork, Flaxville, Jagiello, International [Outlet] Marsh) were visited and surveyed, at least in part.

Historical records from museum collections can be very useful in determining long-term changes in populations or shifts in biodiversity (Shaffer et al. 1998). Historical locations of amphibians and reptiles were recorded from the literature (see Bibliography) and museum specimen records. Records were received from over 20 major North American museums that have computerized their collection records (see Acknowledgments). Locations derived from these sources have been entered into a database and digitized.

Survey sites (n = 19) were chosen based on 3 criteria: 1) few or no previous surveys by MTNHP zoologists, 2) location of reservoirs and ponds, streams, seeps and wetlands on topographic maps, and 3) accessibility of the wetlands by roads. From 15-240 minutes were spent during each site survey (mean = 57.1 minutes), depending upon the size of the area, site conditions, and what was found. Initially, the shoreline or wetland margin was searched by walking slowly along the edge and up into the surrounding vegetation, including rolling over rocks and logs. At regular intervals, the aquatic habitat was sampled for tadpoles or larvae using a dipnet. If the initial sampling showed amphibian/ reptile species present, further effort was expended in order to get a more comprehensive view of abundance and distribution.

An attempt was made to capture at least the first few individuals of a species seen at a survey site. The species name was recorded along with developmental stage and sex (if possible); the animals were then released. On occasion, representative samples of the more common species in an area were preserved for permanent museum records and will be deposited at the Idaho State University Museum. Water temperature, air temperature, and a general description of the area were recorded. Standardized data sheets were used during this project; the amphibian survey data sheet was developed by U.S. Fish and Wildlife Service and is used extensively by a variety of researchers in the western U.S. Much site-specific data was gathered during these surveys; not all data has been analyzed or is presented in this report, but is available upon request from the Montana Natural Heritage Program.

Figure 1. U.S. Fish and Wildlife Service refuges and waterfowl production areas visited during 1998-1999 site surveys.



RESULTS AND DISCUSSION

General Summary

A total of 19 site surveys was conducted in May-July 1998 and June 1999 (Appendix 1), on 12 of which one or more species of amphibian or reptile were present. Localized sites encompassing a wide range in land area across much of central and eastern Montana were covered in the inventory (Figure 1). Included were visits to 15 "units at seven National Wildlife Refuges (NWR's) and six Waterfowl Production Areas (WPA's); two of the NWR's visited included two discrete management units each (see USFWS Unit Accounts). No species were found on seven site surveys. On four of these, basins containing water were completely or mostly dry at the time of the survey, so chances of detecting any species were greatly diminished and largely dependent upon locating snakes which, barring fortuitous encounters, often require labor-intensive searches. During the other three site surveys, failure to detect any species may have been due to the time of day, weather conditions, or other factors (including length of search and size of search area) at the time of sampling. It is recommended that lentic sites (ponds, reservoirs, marshes, etc) be sampled more than once during a breeding season to increase the likelihood of detecting rare, cryptic, and later or earlier-breeding species (Thoms et al. 1997). This was not done at several locations for logistical reasons, but is the recommended procedure for future survey efforts.

Four amphibian and three reptile species were detected on 12 site surveys at 9 USFWS administered units during the 1998-1999 inventory (Appendix 2). Amphibian and reptile species, and number of surveys and WPA/NWR units where detected, included Tiger Salamander (*Ambystoma tigrinum*) on 1 survey (1 unit), Western Chorus Frog (*Pseudacris triseriata* [= *maculata*]) on 4 surveys (3 units), Woodhouse's Toad (*Bufo woodhousii*) on 2 surveys (2 units), Northern Leopard Frog (*Rana pipiens*) on 4 surveys (3 units), Painted Turtle (*Chrysemys picta*) on 1 survey (1 unit), Racer (*Coluber constrictor*) on 1 survey (1 unit), and Plains Garter Snake (*Thamnophis radix*) on 3 surveys (2 units). No species were detected on 7 site surveys, one species on 8 site surveys, and two species on 4 site surveys.

No species were detected during site surveys at 6 units (Halfbreed NWR, Lake Mason NWR [Lake Mason and Willow Creek units], Medicine Lake NWR, Tew WPA, Spidell WPA). One species was detected at 5 units (Charles M. Russell NWR, Hailstone NWR, Flaxville WPA, International [= Outlet] Marsh WPA, Jagiello WPA), two species at 3 units (Lame Steer NWR, War Horse Lake NWR [War Horse Lake and Yellow Water Reservoir units]), and three species at 1 unit (Clarks Fork WPA).

Opportunistic sightings from MTNHP and refuge personnel in 1998-1999 on or near USFWS units added five species (all snakes) not reported during site surveys: Smooth Green Snake (*Liochlorophis vernalis*), Gopher Snake (*Pituophis catenifer*), Common Garter Snake (*Thamnophis sirtalis*), Western Terrestrial Garter Snake (*Thamnophis elegans*), and Western Rattlesnake (*Crotalus viridis*). In addition to the 19 site surveys on USFWS units, there were eight MTNHP site surveys in late June-early July 1998 on other public lands (all BLM); seven surveys were in Musselshell County from near Roundup to the Lake Mason NWR vicinity, and one survey was north of Winnett in Petroleum County. Results of these eight surveys included Tiger Salamander at 2 sites, Western Chorus Frog at 7 sites, Northern Leopard Frog at 2 sites, and Plains Garter Snake at 4 sites.

The following accounts are organized by USFWS unit, beginning with NWR's (including one not surveyed by MTNHP during 1998-1999) and followed by WPA's (again, including one not surveyed in 1998-1999). Included in each account are a description of the 1998-1999 survey results and a summary of species previously documented from each unit and in the MTNHP databases in Helena.

USFWS Unit Accounts

Bowdoin National Wildlife Refuge. No surveys were conducted at this unit in 1998-1999. However, five species were reported in 1999 by refuge personnel from various sections on the refuge. These included Tiger Salamander (1 adult in the Dry lake unit on 23 June, 1 adult on the west side of Lake Bowdoin in 10 October), Gopher Snake (1 at Black Coulee Inlet on 5 May), Racer (1 near the shop building on 27 June, 1 ca. 3 miles NE of Headquarters on 28 June), Common Garter Snake (1 on 15 August on the east side of Drumbo), and Plains Garter Snake (1 on 27 June near the shop, 1 on 15 August on the east side of Drumbo). There are records of three additional species from this unit in the MTNHP databases: Western Chorus Frog, Painted Turtle, Western Rattlesnake (see Hendricks and Reichel 1998).

Charles M. Russell National Wildlife Refuge. One survey was conducted on this refuge during 1998-1999; one species was detected. Woodhouse's Toad (ca. 200+ tadpoles with no or early hind limb buds) was observed near the confluence of Crooked Creek and Fort Peck Reservoir on 19 June 1999. There are records of 11 additional species from throughout this refuge in the MTNHP databases: Tiger Salamander, Western Chorus Frog,, Great Plains Toad (*Bufo cognatus*), Northern Leopard Frog, Painted Turtle, Spiny Softshell (*Trionyx spiniferus*), Racer, Gopher Snake, Western Hognose Snake (*Heterodon nasicus*), Common Garter Snake, Western Rattlesnake (see Hendricks and Reichel 1998).

Hailstone National Wildlife Refuge. One survey was conducted on this refuge in 1999, on 5-6 June. Only one species was detected during four hours of survey effort and an overnight stay. A single adult (total length = 60 cm) Racer was found dead along the outlet creek. No frogs or toads were seen or heard. There are no records of other species at this unit in the MTNHP databases.

Halfbreed National Wildlife Refuge. One survey was conducted on this refuge in 1999, on 5 June. No amphibian or reptile species were found, but only a small section was surveyed. There are records of two species (Tiger Salamander, Western Rattlesnake) at this unit in the MTNHP databases.

Lake Mason National Wildlife Refuge (Lake Mason unit). One survey was conducted on this refuge unit in 1999, on 6 June. The lake bed was mostly dry. No amphibian or reptile species were detected. There are no records of amphibians or reptiles from this refuge unit in the MTNHP databases. However, a survey of a reservoir in T10NR24ES31NE, 5 mi. NW of Lake Mason (on BLM land), detected 50-100 adult Western Chorus Frogs on 21 June 1998. Also, Northern Leopard Frogs (3 adults, 2 juveniles) were encountered on 21 June 1998 during a survey on Willow Creek (which drains into Lake Mason) on BLM land in T10NR24ES17NW, about 7 mi. NNW of Lake Mason.

Lake Mason National Wildlife Refuge (Willow Creek unit). One survey was conducted in this unit in 1999, on 6 June. Minerva Creek was dry, no amphibian or reptile species were detected. There are no records of amphibian or reptile species from this unit. However, a road-killed adult (total length = 80 cm) Plains Garter Snake was seen on 6 June on the Snowy Mountain Road about 4 mi. SE of this unit (T10NR23ES11NWSE), and a road-killed Gopher Snake was observed about 7 mi. NE of this unit (T11NR24ES5NESE) on the same date.

Lame Steer National Wildlife Refuge. One survey was conducted on this refuge in 1998, on 23 July. One amphibian and one reptile species were detected at this unit. Northern Leopard Frogs were collected within 4 miles of this site in 1915, and the species is still present. Leopard frogs (2 adults, 12 juveniles mostly 4-5 cm snout-vent length) were found below the dam, and in the emergent vegetation in the upper (east) end of the reservoir. One Plains Garter Snake (juvenile) was seen in emergent vegetation along the reservoir above the dam. A local farmer reported Painted Turtles (not seen during the survey) in the reservoir and Common Snapping Turtle in nearby Beaver Creek (also not seen during the survey). There are no records of additional amphibian or reptile species from this unit in the MTNHP databases.

Medicine Lake National Wildlife Refuge. One survey was conducted on this refuge (a marsh near the entrance, in section 31NWNW) in 1998, on 31 May. No amphibian or reptile species were detected. However, Painted Turtle (2 adults) was noted in T32NR57ES32SESW on 30 May 1998, and a road-killed Gopher Snake was seen W of Froid near Big Muddy Creek N of Johnson Lake (T30NR55ES21SWNE) on 28 May 1998. Refuge personnel reported five species in 1999 (two amphibian, 2 reptile): Tiger Salamander (Big Island Pelican Colony; thousands regurgitated to chicks in July and August), Northern Leopard Frog (refuge headquarters on 27 September, many other localities and dates), Smooth Green Snake (Bridgerman Point in May-June, Headquarters on 25 June and August-September, T31WR55ES21 on 13 May, Medicine Lake School football field [off-refuge] in September), and Western Terrestrial Garter Snake (several observations in 1998 and 1999). An unidentified toad (possibly Woodhouse's Toad) was also noted at headquarters. There are records of two additional species from this refuge (Racer, Western Hognose Snake) in the MTNHP databases. There are also records of Northern Leopard Frog for this unit from 1942, and the species is still present.

War Horse National Wildlife Refuge (War Horse Lake unit). Three surveys were conducted at this unit in 1998-1999. No amphibians or reptiles were detected on 27 May 1998 along the southern shoreline (no emergent vegetation). Western Chorus Frogs (10+ calling adults) were present on 31 May 1998 along the inlet canal. Northern Leopard Frogs (3 juveniles 4.0 cm snout-vent length) were in a small stock pond near the inlet canal, and 2 tadpoles (4.0 and 4.5 cm total length) were captured in the inlet canal proper on 20 June 1999. There are records of one additional amphibian species (Plains Spadefoot, *Spea bombifrons*) from this unit in the MTNHP databases. A Western Rattlesnake was seen about 8 mi. E of this unit on the Valentine-Dovetail Road (T16NR26ES1NENE) on 21 June 1999, and a Racer was seen a few miles farther (on Dovetail Road) on the same date.

War Horse National Wildlife Refuge (Yellow Water Reservoir unit). Two site surveys were conducted at this unit during 1998-1999. One amphibian and one reptile species were detected. Northern Leopard Frog was reported at this unit in 1950 and was still present. One adult was noted in the outflow marsh below the dam on 27 May 1998. Plains Garter Snake was noted on 27 May 1998 (1 adult in the marsh below the dam) and 18 June 1999 (1 adult along the outflow ditch below the dam).

There are records of one additional amphibian species (Western Chorus Frog) from this unit in the MTNHP databases.

Clarks Fork Waterfowl Production Area. Two site surveys were conducted at this unit in 1999, on 15 and 23 June. Two amphibian and one reptile species were detected: Western Chorus Frog (2 calling adults in the pond near the parking area on 15 June, 10 in the same ponds and the main marsh on 23 June), Woodhouse's Toad (3 adults, 6-8 cm snout-vent length; 50+ tadpoles 3 cm total length, all in the main marsh on 23 June), Painted Turtle (1 adult in gravel pond close to parking area on 15 June). The toad and turtle records are the first reported for Carbon County. There are no records of additional amphibian or reptile species for this unit in the MTNHP databases.

Erickson Waterfowl Production Area. This unit near Medicine Lake NWR was not surveyed in 1998-1999. However, a juvenile Smooth Green Snake (about 24 cm total length), apparently killed during a hail storm, was reported on 7 July 1998 by Lance Tanino, and is the first specimen of this species collected in Montana. There are no other records of amphibians or reptiles for this unit in the MTNHP databases.

Flaxville Waterfowl Production Area. One site survey was conducted at this unit in 1998, on 29 May. One amphibian species was observed. Northern Leopard Frog (3 juveniles ca. 4 cm snout-vent length) were seen in two areas: one N of Highway 5, and two in emergent vegetation on the W side of the pothole S of the highway. There is a record of one additional amphibian species, Canadian Toad (*Bufo hemiophrys*), from this unit in the MTNHP databases. This record (30 July 1966) is the only confirmed report for Montana (see Black and Bragg 1968). The species was not seen during the 1998 survey, but the site merits additional surveys.

International (Outlet) Marsh Waterfowl Production Area. One site survey was conducted at this unit in 1998, on 29 May. One amphibian species was observed. Tiger Salamander (1 large larva ca. 13 cm total length) was observed in the outlet stream draining the marsh. Large portions of the marsh were not surveyed, and the site merits additional survey effort. There are no records of additional amphibian or reptile species from this unit in the MTNHP databases.

Jagiello Waterfowl Production Area. One site survey was conducted at this unit in 1998, on 29 May. One amphibian species was observed. Western Chorus Frog (4 adults, 4 tadpoles 2-3 cm total length) were detected in emergent vegetation in the southern half of this pothole. This site merits additional surveys. There are no records of additional amphibian or reptile species from this unit in the MTNHP databases.

Spidell Waterfowl Production Area. One site survey was conducted at this unit in 1999, on 6 June. No amphibian or reptile species were observed. The lakebed was completely or nearly dry, and no amphibians were seen or heard in the small water bodies along the road. There are no records of any amphibian or reptile species from this unit in the MTNHP databases. This unit should be resurveyed when water is present.

Tew Waterfowl Production Area. One site survey was conducted at this unit in 1999, on 6 June. No amphibian or reptile species were observed. All potholes were completely dry, and no amphibians or reptiles were seen or heard in the small cattail marshes traversed. There are no records of any amphibian or reptile species from this unit in the MTNHP databases. This unit should be resurveyed when water is present.

RECOMMENDATIONS

Surveys and Research

1) Incidental sightings of amphibians and reptiles from the different USFWS units should be recorded and forwarded to the Natural Heritage Program. Of particular interest are all observations and locations of breeding amphibians (tadpoles and/or eggs) and all reptiles. Use Reichel and Flath (1995) as an identification aid. Vouchers of amphibian tadpoles can be sent to the Natural Heritage program for identification. The Natural Heritage website has an online form for submitting amphibian and reptile observation data at http://nris.mt.gov/mtnhp/index.html.

2) Due to the time constraints and the large area covered in this survey, it should not be regarded as a definitive index of all the amphibians and reptiles or their presence on the surveyed units. The secretive habits of many amphibians and reptiles, and our lack of knowledge regarding their reproductive behavior make it difficult to assess their overall status. Sites surveyed should include multiple visits, preferably during different times of the year (for surveys) and in different years (for monitoring). We recommend that additional surveys be conducted.

3) Long-term monitoring of typical marsh-pond habitats at several units should be established, especially where there has been prior survey effort. These monitoring sites permit assessment of population trends and breeding success of the more common species: Tiger Salamander, Western Chorus Frog, Woodhouse's Toad, Northern Leopard Frog, and Plains Garter Snake. Particular attention needs to be given to any toad and Northern Leopard Frog breeding sites found, as these species appear to be experiencing declines in abundance in many areas within Montana and in other regions. Life history and ecology of the amphibians in Montana is still poorly known for most species. Long-term monitoring will provide information on timing of breeding and habitat requirements needed for successful reproduction, as well as the kind of information needed for successful management of local populations.

Management

1) With an increasing number of amphibian species declining for a variety of reasons, it is reasonable to manage habitat to support them. While not all ways of preserving and protecting these species are currently known, several management actions could impact them negatively. Amphibians cannot survive without adequate breeding sites, and the type of water used is often species-specific.

    a) Stocking fish in ponds and reservoirs currently lacking fish, and in which amphibians breed, should be carefully evaluated. Fish introductions are thought to be a major factor negatively impacting amphibian populations in California (Hayes and Jennings 1986, Fellers and Drost 1993, Drost and Fellers 1996) and Oregon (Kiesecker and Blaustein 1998). It may even be desirable to remove introduced fish from some water bodies.

    b) When altering springs and seeps for livestock, protect a portion of the area that is suitable for amphibian reproduction. This could include small fenced exclosures *above* water diversions to stock tanks; water from natural springs and seeps should not be diverted immediately into stock tanks, as this could exclude amphibians from access to the water. At sites with significant overflow from wells and tanks, consider creating livestock exclosures along portions of the outflow. Consider fencing off sections of ponds and reservoirs that include shoreline emergent

vegetation. This provides egg-laying sites and cover to immature amphibians, and also provides adults and immature stages with refugia from trampling by livestock. Exclosures at ponds and smaller reservoirs should be designed to account for water loss during evaporative drawdown, and encompass some water that will last at least to mid-August if possible.

c) Create new ponds exclusively for amphibians to which livestock are excluded. Creation of buffer zones (Semlitsch 1998) around these sites (and other sites as well) should also be considered, as the standing water in wetlands is used primarily for breeding and tadpole/larval development, not for much of adult activity by several species of semi-aquatic amphibians (such as Tiger Salamanders and the toads). Semi-aquatic species may disperse from large distances (> 2 km perhaps) to wetland sites to breed. Adult habitats also need to be considered in any active management program for amphibians.

2) A critical component of the life cycle in snakes is the wintering den. Many species hibernate in large aggregations at traditional den sites. Often these hibernacula are used by more than one species (Koch and Peterson 1995), and mating often takes place at or near the den site. Snakes then move away from dens for as much as 6 miles in summer, returning in the fall to over-winter. These sites typically are situated where snakes can get well down into an area of fractured rock, often near cliffs or in talus slopes. While these sites are robust, they are vulnerable to disturbance, such as road building, or vandalism and over-collecting. Den sites should be documented and protected. Fencing around dens might be suitable in some situations to exclude livestock. Sites should be monitored annually to determine use and relative abundance of species present. Den locations should be revealed only to responsible individuals.

3) Traditional nesting sites of Common Snapping Turtles and Spiny Softshells, especially on the Charles M. Russell NWR where they are mostly likely to occur, should be protected from disturbance of any kind, through use of livestock exclosures if necessary. Most nesting sites, however, will be near larger rivers and tributaries in sandy and sand-deposition sites, and subjected to flooding and shifts in channels. Protection of individual nests may include establishing predator exclosures around clutches. This would be necessary only if it is evident that predators (skunks and raccoons in particular) are destroying an exceptional number of nests. Predation of turtle nests is often >50% in many areas, but "normal" predation rates for Montana populations are not known.

BIBLIOGRAPHY

Baxter, G. T. and M. D. Stone. 1985. Amphibians and reptiles of Wyoming. Second edition. Wyoming Game and Fish Department. Cheyenne, Wyoming. 137 pp.

Bergeron, D. No date. Terrestrial wildlife survey, Coal Creek Mine Area, Montana, 1977-1978. West. Tech. & Eng., Inc., Helena.

Bernard, S. R. and K. F. Brown. 1977. Distribution of mammals, reptiles, and amphibians by BLM physiographic regions and A. W. Kuchler's associations for the eleven Western States.

Black, J. H. 1967. A blue leopard frog from Montana. Herpetologica 23 (4):314-315.

Black, J. H. 1969. The frog genus Rana in Montana. Northwest Sci. 43:191-195.

Black, J. H. 1970. Amphibians of Montana. Mont. Fish & Game Dept., Pub. No. 1 of Animals of Montana Series.

Black, J. H. 1970. Some aspects of the distribution, natural history and zoogeography of the toad genus Bufo in Montana. M.S. thesis, University of Montana, Missoula.

Black, J. H. 1970. Turtles of Montana. Montana Wildlife, Animals of Montana Series 2:26-32.

Black, J. H. 1971. The toad genus Bufo in Montana. Northwest Sci. 45: 156-162.

Black, J. H. and A. M. Bragg. 1968. New additions to the herpetofauna of Montana. Herpetologica 24:247.

Black, J. H. and V. Craig (eds.). 1970. Amphibians of Montana. Montana Wildlife, Animals of Montana Series 1:1-32.

Bragg, A. N. 1940. Observations on the ecology and natural history of Anura. I. Habits, habitat and breeding of *Bufo cognatus* Say. Amer. Nat. 74:322-438.

Breckenridge, W. J. and J. R. Tester. 1961. Growth, local movements, and hibernation of the Manitoba toad, *Bufo hemiophrys*. Ecology 42:637-646.

Brunson, R. B. 1955. Check list of the amphibians and reptiles of Montana. Proc. Mont. Academy Sci. 15:27-29.

Bureau of Land Management. 1982. Bloomfield - North Fork baseline inventories - wildlife. Miles City, MT.

Burroughs, R. D. 1995. The natural history of the Lewis and Clark Expedition. Michigan State University Press, East Lansing. 340 pp.

Bury, R. B., P. S. Corn, K. B. Aubry, F. F. Gilbert, and L. L. C. Jones. 1991. Aquatic amphibian communities in Oregon and Washington. USDA For. Serv., Pacific NW Res. Station Gen Tech. Rep. PNW-GTR-285:353-362.

Carey, C. 1993. Hypothesis concerning the causes of the disappearance of boreal toads from the mountains of Colorado. Conservation Biology 7(2):355-362.

Censky, E. J. 1986. *Sceloporus graciosus*. Cat. Amer. Amphibians and Reptiles 386.1-4.

Conant, R. 1975. A field guide to reptiles and amphibians of eastern and central North America. Second edition. Houghton Mifflin Co., Boston. xvii + 429 pp.

Cope, E. D. 1879. A contribution to the zoology of Montana. American Naturalist 13:432-441.

Corn, J., and P. Hendricks. 1998. Lee Metcalf National Wildlife Refuge bullfrog and painted turtle investigations: 1997. Montana Natural Heritage Program. Helena, MT. 20 pp.

Corn, P. S. No Date. Comment on the occurrence of Pseudacris clarki in Montana. Bull. Chi. Herp. Soc. 15(3):77-78.

Corn, P. S. and J. C. Fogelman. 1984. Extinction of montane populations of northern leopard frog (*Rana pipiens*) in Colorado. J. Herpetol. 18:147-152.

Craig, V. No date. The Axolotl "Walking Fish." Montana Outdoors? 2 pp.

Cutright, P. R. 1989. Lewis and Clark: pioneering naturalists. University of Nebraska Press, Lincoln. 506 pp.

Davis, C. V. and S. E. Weeks. 1963. Montana Snakes. Montana Dept. of Fish and Game, Helena, MT, pp.1-10.

Diller, L. V., and R. L. Wallace. 1996. Comparative ecology of two snake species (*Crotalus viridis* and *Pituophis melanoleucus*) in southwestern Idaho. Herpetologica 52:343-360.

Dood, A. R. 1980. Terry Badlands nongame survey and inventory: final report. Montana Department of Fish, Wildlife, and Parks BLM Contract #YA-512-CT8-217. 70 pp.

Drost, C. A., and G. M. Fellers. 1996. Collapse of a regional frog fauna in the Yosemite area of the California Sierra Nevada, USA. Conservation Biology 10:414-425.

Dunlap, D. G., and K. C. Kruse. 1976. Frogs of the *Rana pipiens* complex in the northern and central plains states. Southwestern Naturalist 20:559-571.

Econ, Inc. 1974. Terrestrial wildlife inventory for the Lame Jones and Ismay coal lease tracts. Tech. Rpt.

Ernst, C. H. 1971. *Chrysemys picta*. Cat. Am. Amph. Rep. 106.1-106.4.

Ernst, C. H., J. E. Lovich, and R. W. Barbour. 1994. Turtles of the United States and Canada. Smithsonian Institution Press, Washington, D.C. 578 pp.

Farmer, P. J. and K. Burgess. 1983. Jardine area baseline terrestrial wildlife study, May 15, 1981-May 15, 1982, for Homestake Mining Co. West. Tech. Eng., Helena.

Farmer, P. J. and K. Burgess. 1984. Jardine area baseline terrestrial wildlife study. West. Tech. & Eng., Helena.

Farmer, P. J. No date. Terrestrial wildlife survey, Pearl area, Montana, June, 1976 - June, 1977. Westech, Inc., Helena, MT.

Farmer, P. J., S. B. Heath, D. J. Bergeron and K. L. Scow. 1985. Montana Tunnels project-baseline terrestrial wildlife study. Westech, Inc., Helena, MT. for Centennial Minerals, Inc.

Feighley, H. P. 1997. Colonial nesting bird survey on the Bureau of Land Management Lewistown District: 1996. Montana Natural Heritage Program. Helena, MT. 27 pp. [herp locations in appendix]

Fellers, G. M., and C. A. Drost. 1993. Disappearance of the Cascades Frog *Rana cascadae* at the southern end of its range, California, USA. Biological Conservation 65:177-181.

Finch, D. M. 1992. Threatened, endangered, and vulnerable species of terrestrial vertebrates in the Rocky Mountain Region. USFS General Technical Rep. RM-215. 38 pp.

Fitch, H. S. 1980. *Thamnophis sirtalis*. Cat. Am. Amph. Rep. 270.1-270.4.

Fitch, H. S. 1983. *Thamnophis elegans*. Cat. Am. Amph. Rep. 320.1-320.4.

Fitch, H. S. and T. P. Maslin. 1961. Occurrence of the garter snake, *Thamnophis sirtalis*, in the Great Plains and Rocky Mountains. University of Kansas Publications, Museum of Natural History 13(5):289-308.

Flath, D. L. 1981. Vertebrate species of special concern. Montana Department of Fish, Wildlife, and Parks. 74 pp.

Flath, D. L. 1984. Vertebrate species of special interest or concern: mammals, birds, reptiles, amphibians, fishes. Wildlife Division, Montana Department of Fish, Wildlife, and Parks. 76 pp.

Gehlbach, F. R. 1967. *Ambystoma tigrinum*. Cat. Am. Amph. Rep. 52.1-52.4.

Gibbons, J. W., S. S. Novak and C. H. Ernst. 1988. *Chelydra serpentina*. Cat. Am. Amph. Rep. 420.1-420.4.

Halliday, T., and K. Adler. 1991. Encyclopedia of reptiles and amphibians. Facts on File, New York. 143 pp.

Hammerson, G. A. 1982a. Amphibians and reptiles in Colorado. Colorado Division of Wildlife, Denver. vii + 131 pp.

Hammerson, G. A. 1982b. Bullfrog eliminating leopard frogs in Colorado? Herpetol. Rev. 13:115-116.

Hart. M. M., W. A. Williams, P. C. Thornton, K. P. McLaughlin, C. M. Tobalske, B. A. Maxell, D. P. Hendricks, C. R. Peterson, and R. L. Redmond. 1998. Montana atlas of terrestrial vertebrates. Unpublished report. Montana Cooperative Wildlife Research Unit, The University of Montana, Missoula. vii + 1302 pp.

Hayes, M. P., and M. R. Jennings. 1986. Decline of ranid frog species in western North America: are bullfrogs (*Rana catesbeiana*) responsible? Journal of Herpetology 20:490-509.

Hendricks, P. 1996. Geographical distribution. *Thamnophis elegans vagrans*. Herpetological Review 27(2):89.

Hendricks, P. 1999. Amphibian and reptile survey of the Bureau of Land Management Miles City District, Montana. Montana Natural Heritage Program. Helena, MT. 80 pp.

Hendricks, P., and J. D. Reichel. 1996. Preliminary amphibian and reptile survey of the Ashland District, Custer National Forest: 1995. Montana Natural Heritage Program. Helena, MT. 79 pp.

Hendricks, P., and J. D. Reichel. 1998. Amphibian and reptile survey on Montana refuges: 1996. Montana Natural Heritage Program. Helena, MT. 19 pp.

Heyer, W. R., M. A. Donnelly, R. W. McDiarmid, L. C. Hayek, and M. S. Foster (eds.). 1994. Measuring and monitoring biological diversity: Standard methods for amphibians. Smithsonian Institute Press, Washington, D.C. 364 pp.

Holroyd, G. L., G. Burns and H. C. Smith (eds). 1991. Proceedings of the second endangered species and prairie conservation workshop. Provincial Museum of Alberta, Nat. Hist. Occ. Pap. 15. 284 pp.

Jellison, W. L. and J. H. Black. 1970. Tularemia in Montana and turtles of Montana. Mt. Wildlife, Nov. 1970. Mont. Fish & Game Dept.

Kerfoot, W. C. 1968. Geographic variability of the lizard, *Sceloporus graciosus* Baird and Girard, in the eastern part of its range. Copeia 1968:139-152.

Kiesecker, J. M., and A. R. Blaustein. 1998. Effects of introduced Bullfrogs and Smallmouth Bass on microhabitat use, growth, and survival of native Red-legged Frogs (*Rana aurora*). Conservation Biology 12:776-787.

Koch, E. D., and C. R. Peterson. 1995. Amphibians and reptiles of Yellowstone and Grand Teton national parks. University of Utah Press. Salt Lake City, Utah. 188 pp.

Koonz, W. H. 1993. Amphibians in Manitoba. pp. 273-275. IN: Holroyd, G. L., H. L. Dickson, M. Regnier and H. C. Smith (eds). Proceedings of the Third Prairie Conservation and Endangered Species Workshop. Provincial Museum of Alberta, Nat. Hist. Occ. Pap. 19. 384 pp.

Leonard, W. P., H. A. Brown, L. L. C. Jones, K. R. McAllister, and R M. Storm. 1993. Amphibians of Washington and Oregon. Seattle Audubon Society. Seattle, Washington. 168 pp.

Martin, P. R. 1980. Terrestrial wildlife habitat inventory in southeastern Montana. MT Dept. of Fish, Wildlife and Parks and BLM.

Martin, P. R. 1980. Terrestrial wildlife inventory in selected coal areas of Montana. MT. Dept. of Fish, Wildlife and Parks and BLM.

Matthews, W. L. no date. Wibaux-Beach wildlife baseline study – nongame species. Unpublished report. BLM Miles City District, Miles City, MT. 93 pp.

Matthews, W. L. 1980. Wibaux-Beach comparison study: Sidney, Glendive and Plevna study areas. Unpublished report. BLM Miles City District, Miles City, MT. 50 pp.

Matthews, W. C. 1981. Broadus-Pumpkin Creek baseline inventory - wildlife. Unpublished report. BLM Miles City District, Miles City, MT.

McEneaney, T. and J. Jensen. 1974. The reptiles and amphibians of the Charles M. Russell National Wildlife Refuge, 1974. Unpubl. mimeo. 3 pp.

Micken, L. 1968. Some summer observations on the tiger salamander, *Ambystoma tigrinum*, in Blue Lake, Madison County Montana. Proc. Mont. Acad. Sci. 28:77-80.

Micken, L. 1971. Additional notes on neotenic *Ambystoma tigrinum melanostictum* in Blue Lake, Madison County, Montana. Proc. Mont. Acad. Sci. 31:62-64.

Miller, J. D. 1978. Observations on the diet of *Rana pretiosa*, *Rana pipiens*, and *Bufo boreas* from western Montana. Northwest Science 52:243-249.

Montana Department of State Lands and U. S. Office of Surface Mining. 1982. Final EIS, Western Energy Company's Rosebud Mine Area C, Block 1.

Montana Department of State Lands. No date. Draft EIS, proposed plan of mining and reclamation, Zortman Mining Company and Landusky Mining Company, Phillips County, MT.

Mosimann, J. E. and G. B. Rabb. 1952. The herpetology of Tiber Reservoir Area, Montana. Copeia 1952:23-27.

Mueller, C. F. 1969. Temperature and energy characteristics of the sagebrush lizard (*Sceloporus graciosus*) in Yellowstone National Park. Copeia 1969:153-160.

Mueller, F. C. and R. E. Moore. 1969. Growth of the sagebrush lizard, *Sceloporus graciosus*, in Yellowstone National Park. Herpetologica 25:35-38.

Nelson, D. J. 1948. *Lampropeltis triangulum gentilis* in Montana. Herpetologica 4:170.

Nelson, D. J. 1950. *Lampropeltis triangulum gentilis* in Montana. Herpetologica 6:41.

Olson, D. H., W. P. Leonard, and R. B. Bury (eds.). 1997. Sampling amphibians in lentic habitats. Northwest Fauna Number 4. 134 pp.

Olson-Elliott and Associates. 1979. Environmental impact of the northern tier pipeline in Montana. Tech. Report prepared for Montana Department of Natural Resources and Conservation.

Olson-Elliott and Associates. 1980. Terrestrial wildlife inventory, Montco wildlife study area. Tech. Report for Montco, Billings, MT.

Ortenburger, A. I. 1921. An eastern record and note on *Charina bottae* (Blainville). Copeia 100:84.

Phillips, K. 1990. Where have all the frogs and toads gone? BioScience 40:422-424.

Platt, D. R. 1969. Natural history of the Hognose Snakes *Heterodon platyrhinos* and *Heterodon nasicus*. Univ. Kan. Publ., Mus. Nat. History 18(4):253-420.

Powell, G. L., and A. P. Russell. 1998. The status of short-horned lizards, *Phrynosoma douglasi* and *P. hernandezi*, in Canada. Canadian Field-Naturalist 112:1-16.

Powell, G. L., A. P. Russell, and P. J. Fargey. 1998. The distribution of the Short-horned Lizard *Phrynosoma hernandezi* in Saskatchewan, Canada. Northwestern Naturalist 79:19-26.

Redmond, R. L., M. M. Hart, J. C. Winne, W. A. Williams, P. C. Thornton, Z. Ma, C. M. Tobalske, M. M. Thornton, K. P. McLaughlin, T. P. Tady, F. B. Fisher, and S. W. Running. 1998. The Montana GAP Project: final report. Unpublished report. Montana Cooperative Wildlife Research Unit, The University of Montana, Missoula. xiii + 136 pp. + appendices.

Reel, S. 1989. Vest-pocket preserves. Montana Outdoors 20(2):27-29.

Reel, S., L. A. Schassberger, and W. Ruediger. 1989. Caring for our natural communities: Region 1 - threatened, endangered and sensitive species program. USDA, USFS, Northern Region, Missoula, Montana.

Reichel, J. D. 1995a. Preliminary amphibian and reptile survey of the Lewis and Clark National Forest: 1994. Montana Natural Heritage Program. Helena, MT. 92 pp.

Reichel, J. D. 1995b. Preliminary amphibian and reptile survey of the Sioux District of the Custer National Forest: 1994. Montana Natural Heritage Program. Helena, MT. 75 pp.

Reichel, J. D. 1996. Preliminary Colonial Nesting Bird Survey of the Bureau of Land Management Lewistown District: 1995. Montana Natural Heritage Program. Helena, MT. 97 pp.

Reichel, J. D. and D. L. Flath. 1995. Identification guide to the amphibians and reptiles of Montana. Montana Outdoors 26(3):15-34.

Roedel, M. D. 1999. Montana animal species of special concern. [unpublished list] Montana Natural Heritage Program, Helena. 8 pp.

Roedel, M. D., and P. Hendricks. 1998. Amphibian and reptile survey on the Bureau of Land Management Lewistown District: 1995-1998. Montana Natural Heritage Program. Helena, MT. 53 pp.

Russell, A. P., and A. M. Bauer. 1993. The amphibians and reptiles of Alberta. University of Alberta Press. Edmonton, Alberta. 264 pp.

Scow, K. L. 1978. Terrestrial wildlife survey, Zortman and Landusky areas, Little Rocky Mountains, MT. Tech. Rpt. for Zortman and Landusky Mining Co., Inc., by Westech, Inc.

Secoy, D. M., and T. K. Vincent. 1976. Distribution and population status of Saskatchewan's amphibians and reptiles. Final report. Saskatchewan Department of Environment. Regina, Saskatchewan. 42 pp. [unnumbered]

Semlitsch, R. D. 1998. Biological delineation of terrestrial buffer zones for pond-breeding salamanders. Conservation Biology 12:1113-1119.

Semlitsch, R. D., and J. R. Bodie. 1998. Are small, isolated wetlands expendable? Conservation Biology 12:1129-1133.

Shaffer, H. B, R. N. Fisher, and C. Daividson. 1998. The role of natural history collections in documenting species declines. Trends in Ecology and Evolution 13:27-30.

Smith, H. M. 1978. A guide to field identification Amphibians of North America. Golden Press, New York.

Smith, H. M. and E. D. Brodie, Jr. 1982. Reptiles of North America. Golden Press, NY. 240 pp.

Stebbins, R. C. 1985. A field guide to western reptiles and amphibians. Second edition. Houghton Mifflin Co., Boston. xiv + 336 pp.

Stuart, L. C. 1930. An extension of the range of *Coluber constrictor mormon* (Baird and Girard). Copeia 1930:44.

Stukel, E. D., and D. C. Backland. 1997. Animal species monitored by the South Dakota Natural Heritage Program. Prairie Naturalist 29:179-213.

Sweet, S. S. and W. S. Parker. 1990. *Pituophus melanolucus*. Cat. Am. Amph. Rept. 474.1-474.8.

Thompson, L. S. 1982. Distribution of Montana amphibians, reptiles, and mammals. Montana Audubon Council. 24 pp.

Thoms, C., C. C. Corkran, and D. H. Olson. 1997. Basic amphibian survey for inventory and monitoring in lentic habitats. Pp. 35-46, *In* Sampling Amphibians in lentic habitats (D. H. Olson, W. P. Leonard, R. B. Bury, eds.). Northwest Fauna No. 4.

Timkin, R. L. and D. G. Dunlap. 1965. Ecological distribution of the two species of *Bufo* in southeastern South Dakota. Proc. S. D. Acad. Sci. 44:113-117.

Tinkle, D. W., A. E. Dunham, and J. D. Congdon. 1993. Life history and demographic variation in the lizard *Sceloporus graciosus*: a long-term study. Ecology 74:2413-2429.

U.S. Forest Service and Montana Department of State Lands. 1985. Jardine joint venture project.

U.S. Forest Service and Montana Department of State Lands. 1986. Jardine joint venture project, final EIS.

U.S. Geological Survey and Montana Department of State Lands. 1979. Draft, proposed mining and reclamation plan, Pearl Mine, Big Horn County, MT.

U.S. Geological Survey and Montana Department of State Lands. No date. Draft environmental statement, proposed mining and reclamation plan, Spring Creek Mine, Big Horn County, MT.

Visher, S. S. 1914. A preliminary report of the biology of Harding County northwestern South Dakota. South Dakota Geological Survey Bulletin 6:1-126.

VTN. No date. Second year's analysis of terrestrial wildlife on proposed mine access and railroad routes in southern Montana and northern Wyoming, March 1979 - February 1980. Tech. Rep. prepared by VTN Wyoming, Inc., for Shell Oil Co.

Webb, R. G. 1962. North American soft-shelled turtles (Family Trionychidae). Univ. Kan. Publ., Mus. Nat. Hist. 13:429-611.

Webb, R. G. 1973. *Trionyx spinerfus*. Cat. Amer. Amph. and Rept. 140.1-4.

Werner, J. K. 1974. *Phrynosoma douglassi brevirostre*. Herp Review 5(1): 20.

Werner, J. K., T. Plummer, and J. Weaselhead. 1998. Amphibians and reptiles of the Flathead Indian Reservation. Intermountain Journal of Science 4:33-49.

Werner, K. and J. D. Reichel. 1994. Amphibian and reptile survey of the Kootenai National Forest: 1994. Montana Natural Heritage Program. 105 pp.

Westech, Inc. [Western Technology and Engineering]. 1981. The effects of the Tongue River Railroad on terrestrial wildlife. Technical Report for Tongue River Railroad Co.

Westech, Inc. [Western Technology and Engineering]. 1982. Results of Phase one, step one, Little Rockies Project. Tech. Rpt. for Meridan Land and Mineral Co.

Westech, Inc. [Western Technology and Engineering]. 1982. Wildlife reconnaissance, Cypress International Yellowstone Mine. Prepared for Hydrometrics, Inc.

Westech, Inc. [Western Technology and Engineering]. 1987. Valley View Hills: baseline easement report. The Nature Conservancy, Big Sky Field Office, Helena, MT. 44 pp. plus appendices.

Westech, Inc. [Western Technology and Engineering]. No date. Preliminary wildlife reconnaissance, Ruby and Little Ben mine areas, Little Rocky Mountains, Montana. Technical Report for Zortman and Landusky Mining Companies.

Western Ecological Services Co. 1983. Wildlife inventory of the Knowlton known recoverable coal resource area, MT. Prep. for USDI, BLM Cont. No. VA-553-RFP2-1027.

Western Ecological Services Co. 1983. Wildlife inventory of the Southwest Circle known recoverable coal resource area, MT. Prepared for U.S. Department of the Interior, BLM. Contract YA-553-RFP2-1027.

Wheeler, G. C. and J. Wheeler. 1966. The amphibians and reptiles of North Dakota. University of North Dakota, Grand Forks. 103 pp.

Wilson, L. D. 1978. *Coluber constrictor*. Cat. Am. Amph. Rep. 218.1-218.4.

Appendix 1. Site surveys by MTNHP for amphibian and reptiles during 1998-1999 on USFWS units in Montana.

SITE	LOCATION	ELEV.	DATE	START TIME
Charles M. Russell NWR	T20NR29ES36NWSW	2250	19 Jun 99	11:05
Hailstone NWR	T3NR20ES13SW/S24NE	4070	5 Jun 99	15:35
Halfbreed NWR*	T3NR21ES33SE	3940	5 Jun 99	14:05
Lake Mason NWR (Lake Mason)*	T9NR24ES26NW	3610	6 Jun 99	14:00
Lake Mason NWR (Willow Creek)*	T11NR23ES31NE	3940	6 Jun 99	15:30
Lame Steer NWR	T12NR60ES14SW/S15NW	2890	23 Jul 98	10:50
Medicine Lake NWR*	T32NR56ES31NWNW	1940	31 May 98	12:10
War Horse NWR (War Horse Lake)*	T16NR25ES28SW	3000	27 May 98	18:00
War Horse NWR (War Horse Lake inlet)	T16NR25ES29NWNW	3140	31 May 98	18:35
War Horse NWR (War Horse Lake inlet)	T16NR25ES29NWNW	3140	20 Jun 99	13:10
War Horse NWR (Yellow Water Reservoir)	T13NR26ES7SWNE	3000	27 May 98	15:30
War Horse NWR (Yellow Water Reservoir)	T13NR26ES7SWNE	3000	18 Jun 99	10:58
Clarks Fork WPA	T6SR23ES15NWSW	3600	15 Jun 99	11:20
Clarks Fork WPA	T6SR23ES15NW	3600	23 Jun 99	08:50
Flaxville WPA	T35NR50ES8SENE/SESE	2750	29 May 98	12:40
International (Outlet) Marsh WPA	T37NR48ES1SENW	2460	29 May 98	16:15
Jagiello WPA	T37NR49ES14SESE	2460	29 May 98	14:50
Spidell WPA*	T5NR23ES33N	3750	6 Jun 99	11:55
Tew WPA*	T5NR25ES19NE/S20W	3900	6 Jun 99	10:40

* Surveys with no amphibians or reptiles detected.

Appendix 2. Amphibian and reptile species detected during 1998-1999 surveys on USFWS units in Montana.

SITE	SEARCH (hrs:min)	SPECIES (n = adult & juv.; * = eggs, larvae, tadpoles)
Charles M. Russell NWR	0:30	BUWO (*)
Hailstone NWR	4:00	COCO (1)
Halfbreed NWR	0:40	no herps
Lake Mason NWR (Lake Mason)	0:30	no herps (dry)
Lake Mason NWR (Willow Creek)	0:15	no herps (dry)
Lame Steer NWR	1:00	RAPI (14), THRA (1)
Medicine Lake NWR	0:30	no herps
War Horse NWR (War Horse Lake)	0:40	no herps
War Horse NWR (War Horse Lake inlet)	0:25	PSTR (10+)
War Horse NWR (War Horse Lake inlet)	0:30	RAPI (3*)
War Horse NWR (Yellow Water Reservoir)	1:15	RAPI (1), THRA (1)
War Horse NWR (Yellow Water Reservoir)	1:00	THRA (1)
Clarks Fork WPA	0:30	PSTR (2), CHPI (1)
Clarks Fork WPA	2:00	PSTR (10), BUWO (3*)
Flaxville WPA	1:00	RAPI (3)
International (Outlet) Marsh WPA	0:35	AMTI (*)
Jagiello WPA	0:35	PSTR (4*)
Spidell WPA	0:20	no herps (dry)
Tew WPA	0:50	no herps (dry)

AMTI (*Ambystoma tigrinum*: Tiger Salamander), PSTR (*Pseudacris triseriata*: Western Chorus Frog), BUWO (*Bufo woodhousii*: Woodhouse's Toad), RAPI (*Rana pipiens*: Northern Leopard Frog), CHPI (*Chrysemys picta*: Painted Turtle), COCO (*Coluber constrictor*: Racer), THRA (*Thamnophis radix*: Plains Garter Snake).